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Chung et al.

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(54) **TERMINAL FOR INTERNET OF THINGS AND OPERATION METHOD OF THE SAME**

(71) Applicants: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR); **KOREA ELECTRONICS TECHNOLOGY INSTITUTE**, Seongnam-si (KR)

(72) Inventors: **Ji-min Chung**, Yongin-si (KR); **Seung-woo Kum**, Yongin-si (KR); **Young-sun Ryu**, Seongnam-si (KR); **Tae-beom Lim**, Yongin-si (KR)

(73) Assignees: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR); **KOREA ELECTRONICS TECHNOLOGY INSTITUTE**, Seongnam-si (KR)

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This patent is subject to a terminal disclaimer.

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CPC ***H04L 63/104*** (2013.01); ***H04L 63/08*** (2013.01); ***H04L 63/0807*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC . H04L 63/08; H04L 63/0807; H04L 63/0884; H04L 63/104; H04L 67/12
See application file for complete search history.

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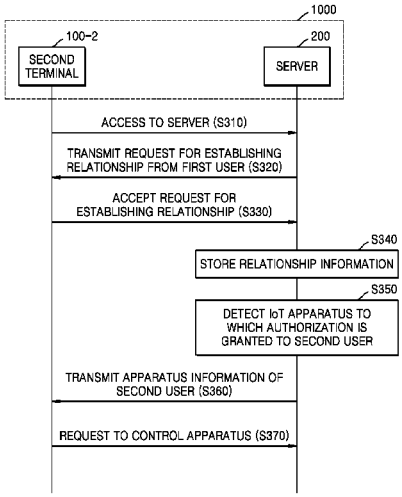
Primary Examiner — Hee K Song
(74) *Attorney, Agent, or Firm* — Nixon & Vanderhye, P.C.

(57) **ABSTRACT**

An example terminal includes a communication circuitry configured to communicate with a server; and a data processor configured to request the server to include a second user in a relationship group of a first user and to extend, to the relationship group, a range of authorization for an Internet of Things (IoT) apparatus registered as an apparatus of the first user.

21 Claims, 16 Drawing Sheets



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H04W 4/08 (2009.01)
H04L 67/12 (2022.01)

(52) **U.S. Cl.**
CPC ***H04L 63/0884*** (2013.01); ***H04L 63/20*** (2013.01); ***H04L 67/12*** (2013.01); ***H04W 4/08*** (2013.01); ***H04W 4/70*** (2018.02)

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FIG. 1

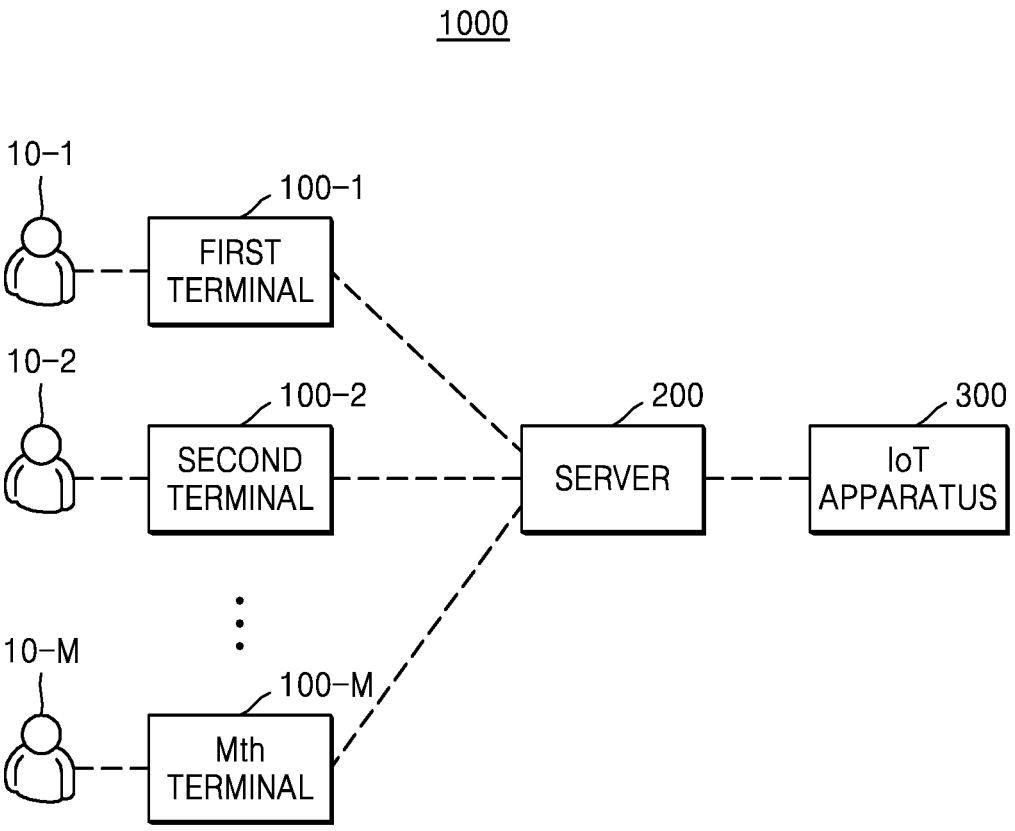

1000
10-1
100-1
FIRST TERMINAL
10-2
100-2
SECOND TERMINAL
200
SERVER
300
IoT APPARATUS
10-M
100-M
Mth TERMINAL

FIG. 2

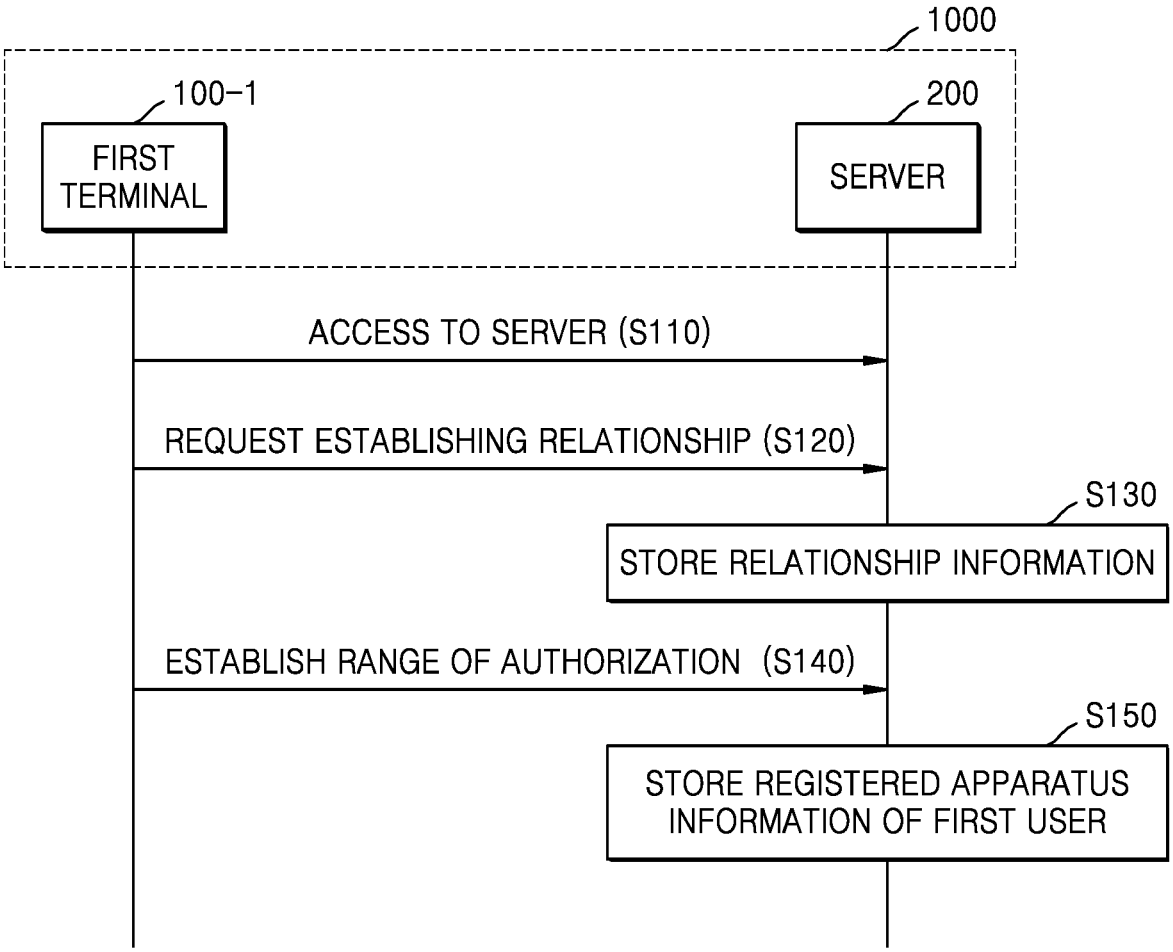

1000
100-1
FIRST TERMINAL
200
SERVER
ACCESS TO SERVER (S110)
REQUEST ESTABLISHING RELATIONSHIP (S120)
S130
STORE RELATIONSHIP INFORMATION
ESTABLISH RANGE OF AUTHORIZATION (S140)
S150
STORE REGISTERED APPARATUS INFORMATION OF FIRST USER

FIG. 3

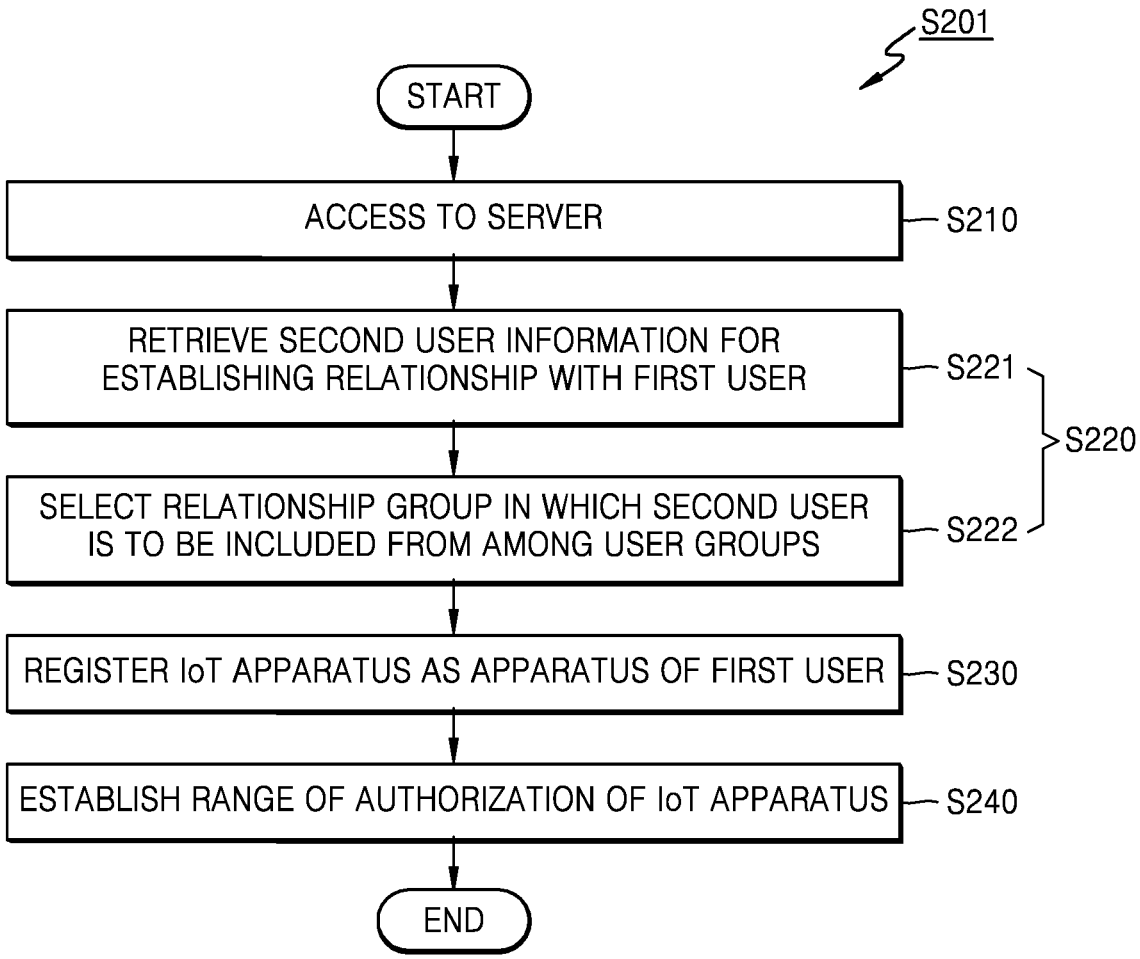

S201
START
ACCESS TO SERVER
S210
RETRIEVE SECOND USER INFORMATION FOR ESTABLISHING RELATIONSHIP WITH FIRST USER
S221
SELECT RELATIONSHIP GROUP IN WHICH SECOND USER IS TO BE INCLUDED FROM AMONG USER GROUPS
S222
S220
REGISTER IoT APPARATUS AS APPARATUS OF FIRST USER
S230
ESTABLISH RANGE OF AUTHORIZATION OF IoT APPARATUS
S240
END

FIG. 4

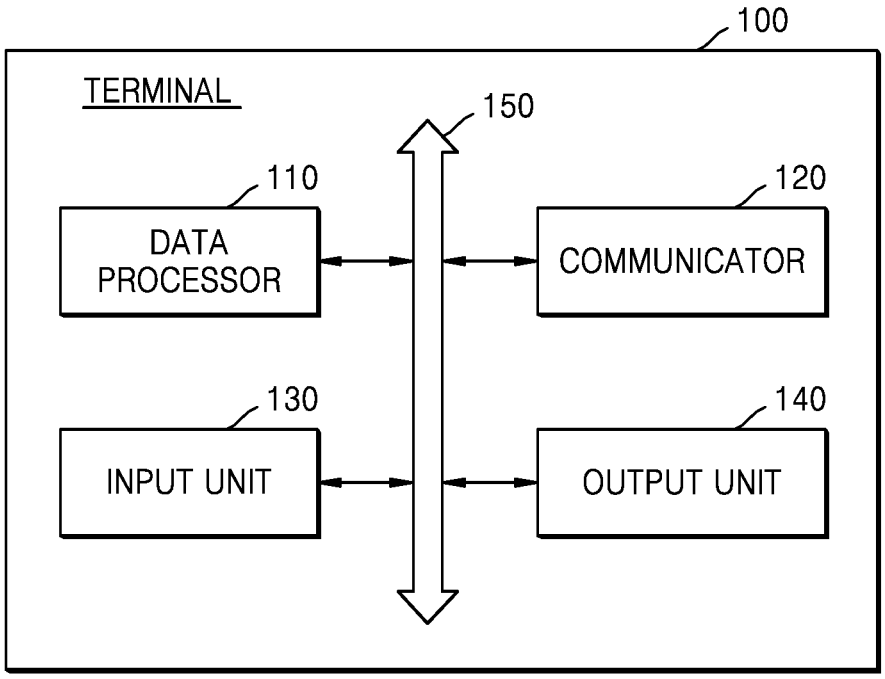

100
TERMINAL
150
110
DATA PROCESSOR
120
COMMUNICATOR
130
INPUT UNIT
140
OUTPUT UNIT

FIG. 5

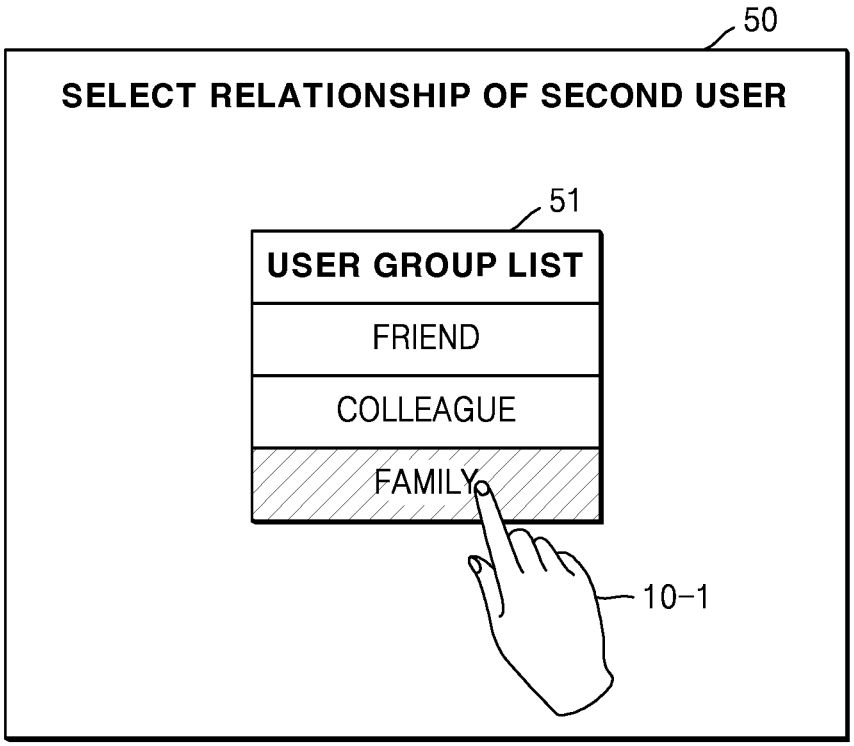

50
SELECT RELATIONSHIP OF SECOND USER
51
USER GROUP LIST
FRIEND
COLLEAGUE
FAMILY
10-1

FIG. 6

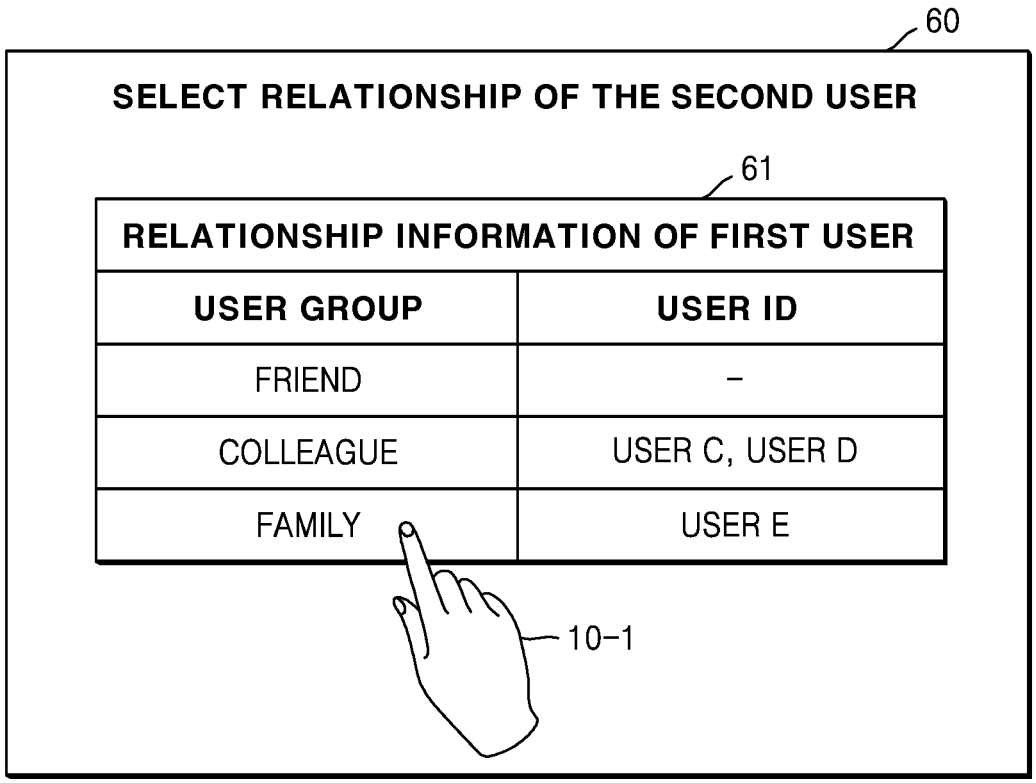

60
SELECT RELATIONSHIP OF THE SECOND USER
61
RELATIONSHIP INFORMATION OF FIRST USER
USER GROUP
USER ID
FRIEND
-
COLLEAGUE
USER C, USER D
FAMILY
USER E
10-1

FIG. 7

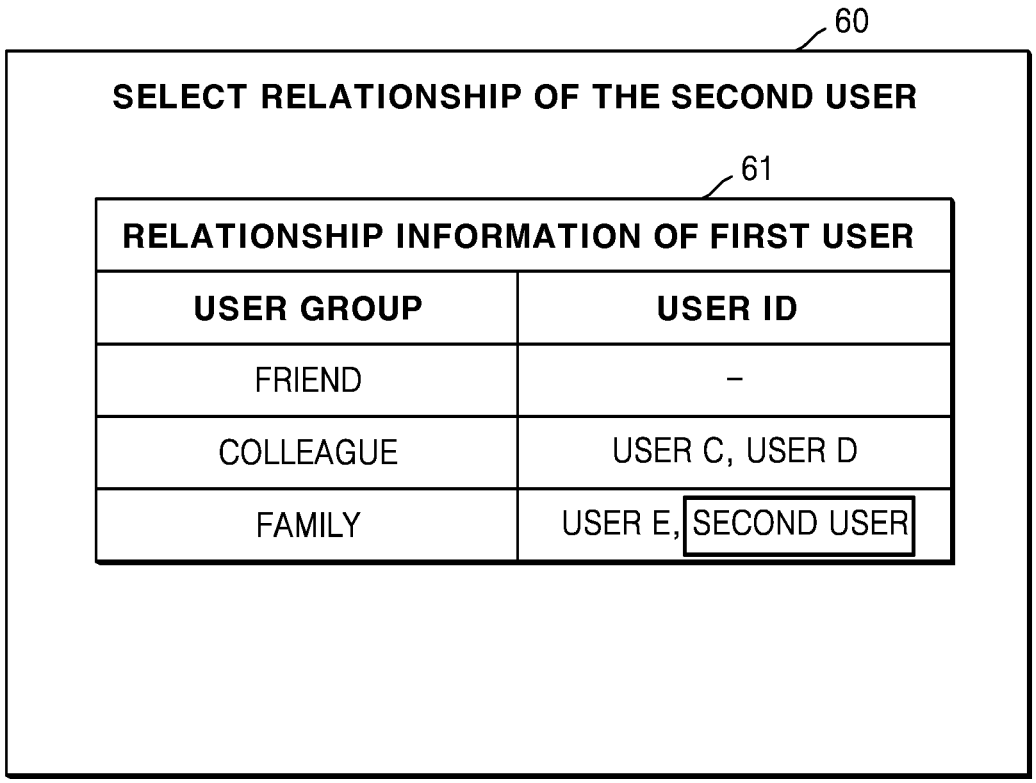

60
SELECT RELATIONSHIP OF THE SECOND USER
61
RELATIONSHIP INFORMATION OF FIRST USER
USER GROUP
USER ID
FRIEND
-
COLLEAGUE
USER C, USER D
FAMILY
USER E, SECOND USER

FIG. 8

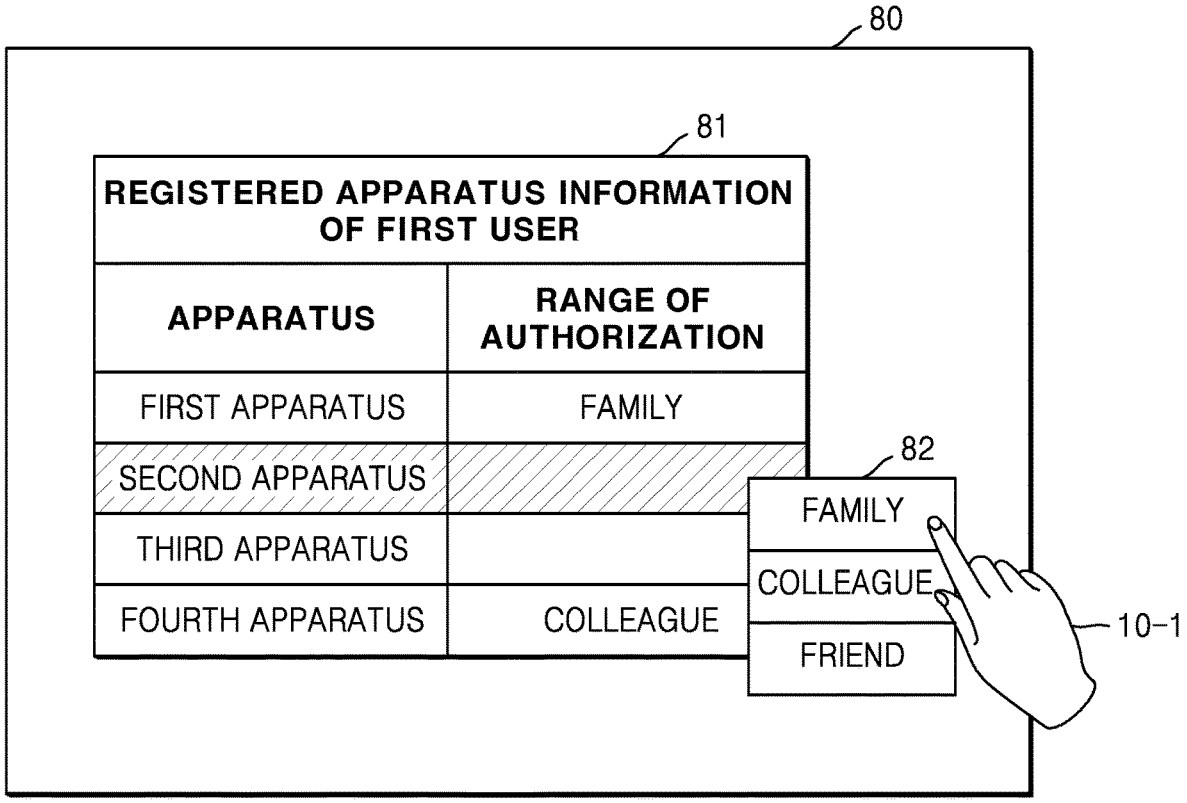

80
81
REGISTERED APPARATUS INFORMATION OF FIRST USER
APPARATUS
RANGE OF AUTHORIZATION
FIRST APPARATUS
FAMILY
SECOND APPARATUS
THIRD APPARATUS
FOURTH APPARATUS
COLLEAGUE
82
FAMILY
COLLEAGUE
FRIEND
10-1

FIG. 9

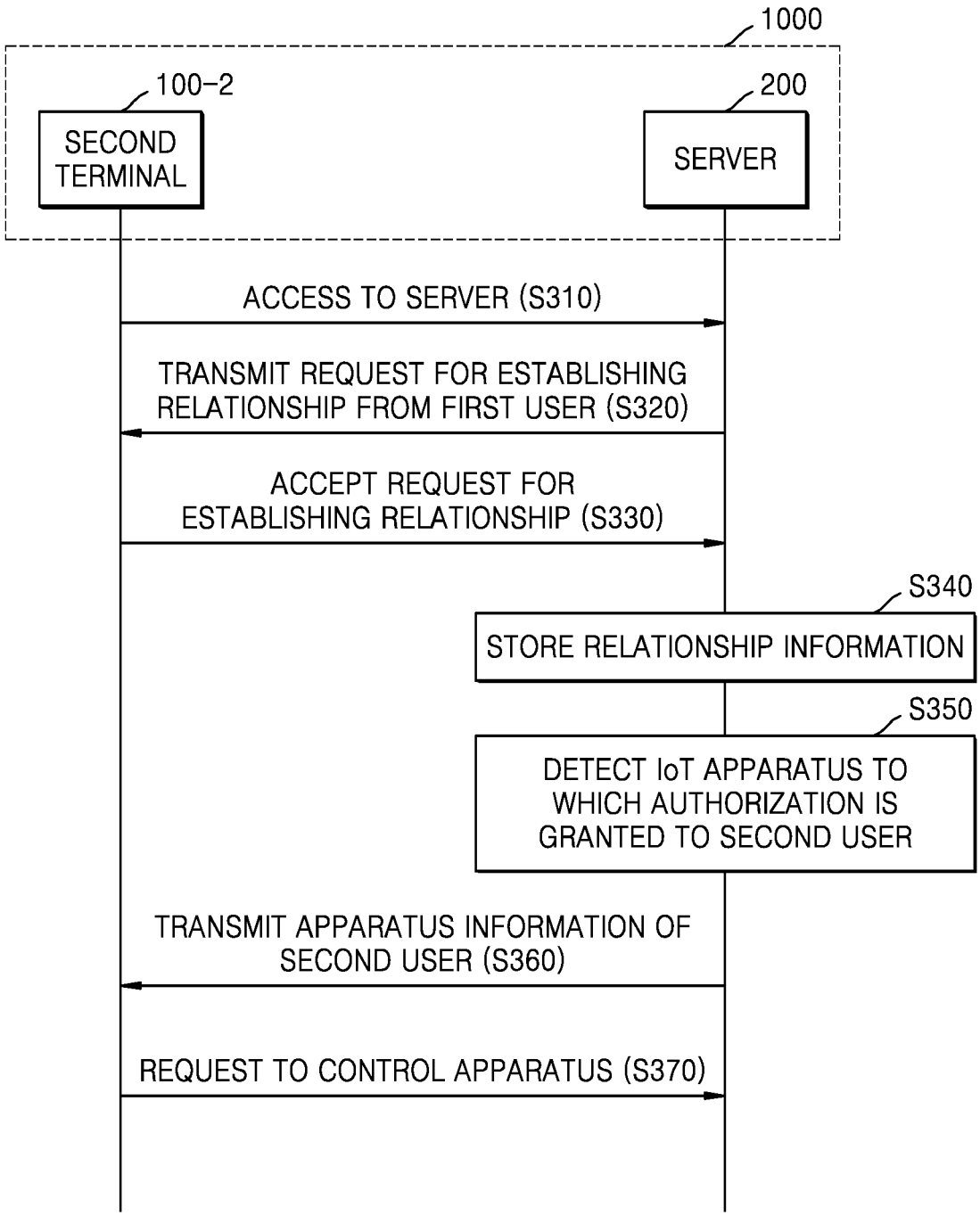

1000
100-2
SECOND TERMINAL
200
SERVER
ACCESS TO SERVER (S310)
TRANSMIT REQUEST FOR ESTABLISHING RELATIONSHIP FROM FIRST USER (S320)
ACCEPT REQUEST FOR ESTABLISHING RELATIONSHIP (S330)
S340
STORE RELATIONSHIP INFORMATION
S350
DETECT IoT APPARATUS TO WHICH AUTHORIZATION IS GRANTED TO SECOND USER
TRANSMIT APPARATUS INFORMATION OF SECOND USER (S360)
REQUEST TO CONTROL APPARATUS (S370)

FIG. 10

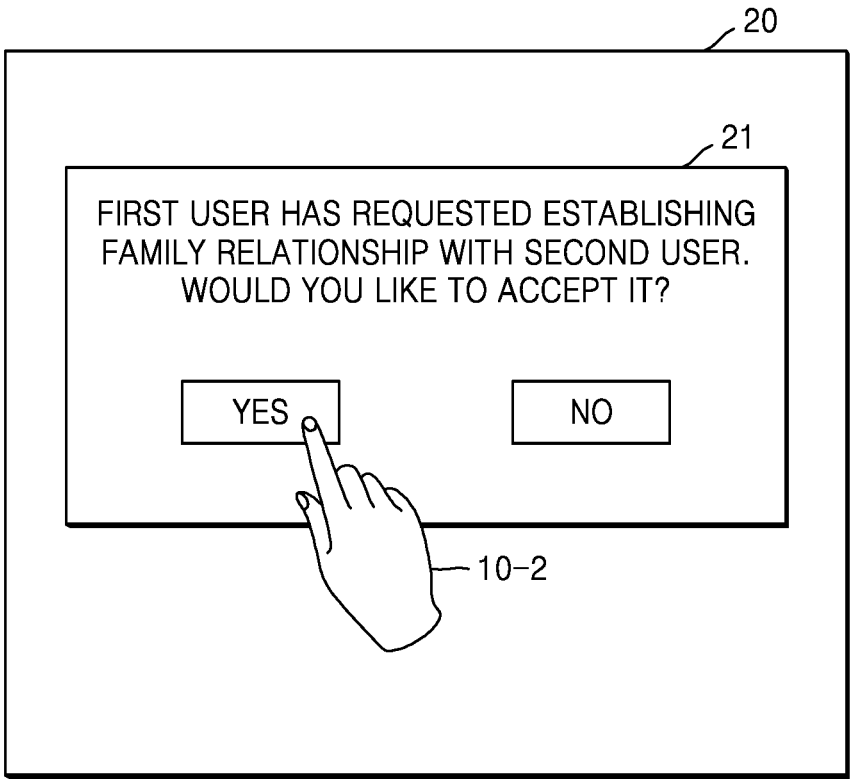

20
21
FIRST USER HAS REQUESTED ESTABLISHING FAMILY RELATIONSHIP WITH SECOND USER. WOULD YOU LIKE TO ACCEPT IT?
YES
NO
10-2

FIG. 11

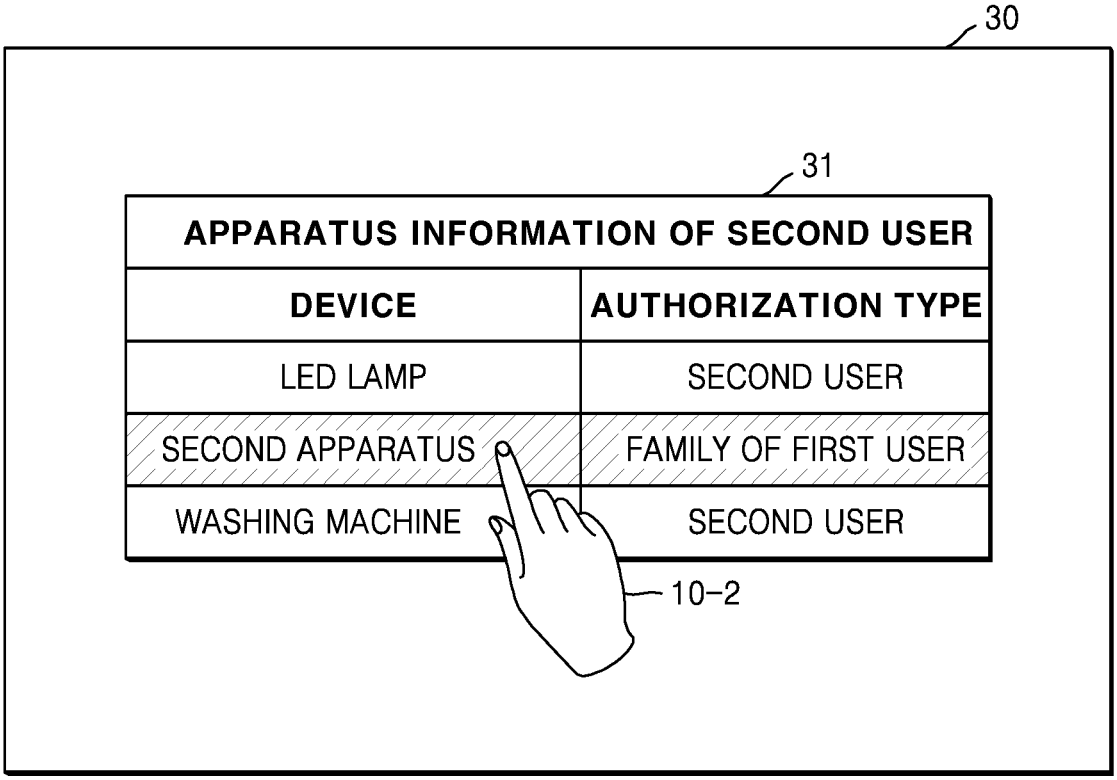

30
31
APPARATUS INFORMATION OF SECOND USER
DEVICE
AUTHORIZATION TYPE
LED LAMP
SECOND USER
SECOND APPARATUS
FAMILY OF FIRST USER
WASHING MACHINE
SECOND USER
10-2

FIG. 12

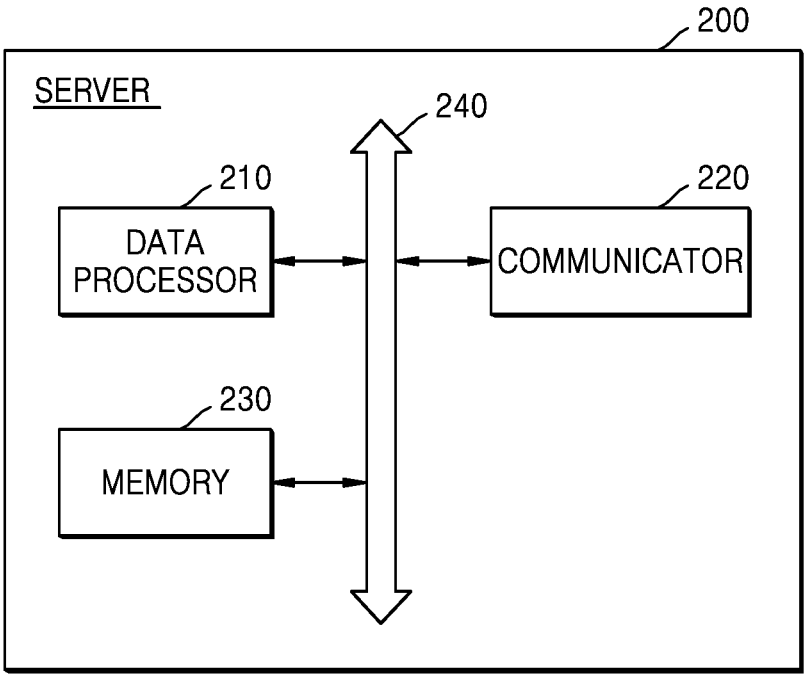

200
SERVER
240
210
DATA PROCESSOR
220
COMMUNICATOR
230
MEMORY

FIG. 13

410

USER ID	USER INFORMATION
IDENTIFIER OF FIRST USER	NAME, PASSWORD, AND EMAIL ADDRESS
IDENTIFIER OF SECOND USER	NAME, PASSWORD, AND EMAIL ADDRESS
⋮	⋮

FIG. 14

420

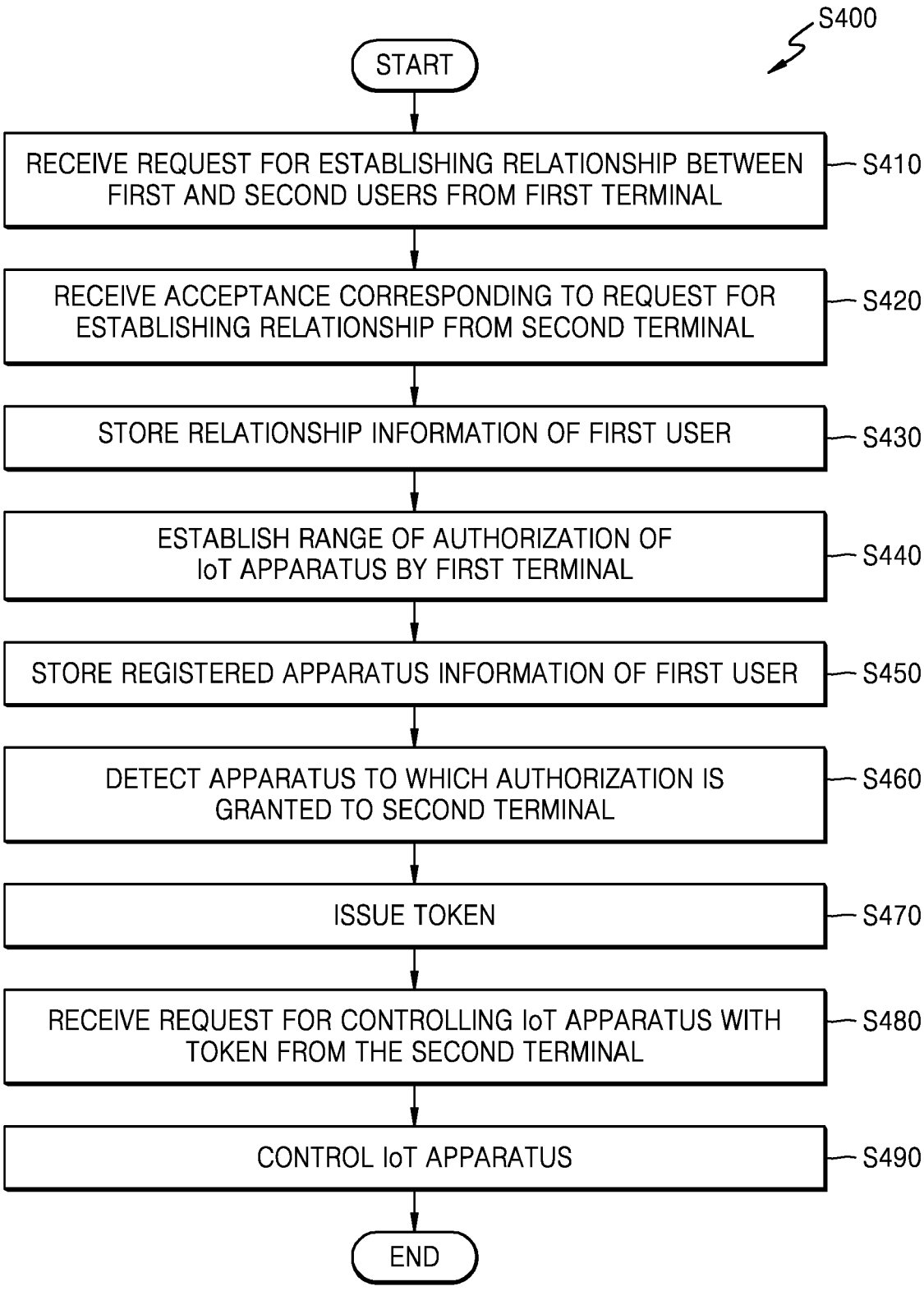
RELATIONSHIP INFORMATION OF FIRST USER	
USER GROUP	**USER ID**
FRIEND	-
COLLEAGUE	USER C, USER D
FAMILY	USER E, SECOND USER

FIG. 15

430

REGISTERED APPARATUS INFORMATION OF FIRST USER	
APPARATUS	**RANGE OF AUTHORIZATION**
FIRST APPARATUS	FAMILY
SECOND APPARATUS	FAMILY
THIRD APPARATUS	-
FOURTH APPARATUS	COLLEAGUE

FIG. 16


S400
START
RECEIVE REQUEST FOR ESTABLISHING RELATIONSHIP BETWEEN FIRST AND SECOND USERS FROM FIRST TERMINAL
S410
RECEIVE ACCEPTANCE CORRESPONDING TO REQUEST FOR ESTABLISHING RELATIONSHIP FROM SECOND TERMINAL
S420
STORE RELATIONSHIP INFORMATION OF FIRST USER
S430
ESTABLISH RANGE OF AUTHORIZATION OF IoT APPARATUS BY FIRST TERMINAL
S440
STORE REGISTERED APPARATUS INFORMATION OF FIRST USER
S450
DETECT APPARATUS TO WHICH AUTHORIZATION IS GRANTED TO SECOND TERMINAL
S460
ISSUE TOKEN
S470
RECEIVE REQUEST FOR CONTROLLING IoT APPARATUS WITH TOKEN FROM THE SECOND TERMINAL
S480
CONTROL IoT APPARATUS
S490
END

TERMINAL FOR INTERNET OF THINGS AND OPERATION METHOD OF THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 14/831,272, filed on Aug. 20, 2015, now U.S. Pat. No. 10,645,089, which claims priority to Korean Patent Application 10-2014-0141205, filed on Oct. 17, 2014. The contents of each of these applications are incorporated herein in their entirety.

BACKGROUND

One or more example embodiments relate to terminals for the Internet of Things (IoT) and operation methods of the same, and more particularly, to terminals for the IoT and operation methods of the same whereby authorization(s) for IoT apparatuses may be shared among users.

The Internet of Things (IoT) refers to a technology that enables a variety of "things" to connect to the Internet through a computer chip and a communication function embedded in each of the "things." An IoT apparatus may be a general apparatus (or a "thing") to which IoT is applied. Examples of IoT apparatuses may include sensors, such as temperature sensors, humidity sensors, sound sensors, motion sensors, proximity sensors, gas sensing sensors, or heat sensing sensors; home appliances, such as refrigerators, CCTVs, TVs, washing machines, or dehumidifiers; electric lights; fire alarms; and household appliances.

A user may remotely control an IoT apparatus by using an IoT terminal. The IoT terminal and the IoT apparatus may be connected to each other via various communication techniques, such as wireless communication, short distance (wired or wireless) communication, home network, or other communication protocols. In this case, a right to control a user's ability to access IoT apparatuses and control the same (e.g., turn on/off, input settings, etc.) is referred to as authorization.

However, an IoT apparatus may be placed in a shared space such as a house or an office. Therefore, a plurality of users may try to control the IoT apparatus. Accordingly, this may cause a problem regarding a sequence of granting authorization to access and control the IoT apparatus to the users.

SUMMARY

One or more example embodiments include terminals for the Internet of Things (IoT) and operation methods of the same whereby authorization to access and control IoT apparatuses may be efficiently shared among users.

Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the example embodiments.

According to one or more example embodiments, a terminal includes a communicator (e.g., modem, transceiver, radio or other communication circuitry) configured to communicate with a server; and a data processor configured to request the server to include a second user in a relationship group of a first user, and to extend a range of authorization for an IoT apparatus registered as an apparatus of the first user to the relationship group.

The data processor may select a user group from among a plurality of user groups as the relationship group.

The terminal may further include an input unit or device (e.g., buttons, keys, switches, touchpad, touchscreen, etc.) configured to receive input from the first user for selecting of the user group from among the user groups as the relationship group.

Various kinds of user groups (e.g., friends, family, colleagues) may be defined in advance by the server.

The input unit or device may further receive input from the first user for selecting the range of authorization of the IoT apparatus as the relationship group such that, for example, members of the relationship group can access and control the IoT apparatus.

According to one or more example embodiments, a terminal includes a communicator configured to communicate with a server; and a data processor configured to accept a request from a first user to include a second user in a relationship group of the first user so that the second user can control an IoT apparatus registered as an apparatus of the first user, wherein a range of authorization for the IoT apparatus is within the relationship group.

According to one or more example embodiments, an operation method of a server includes receiving a request to include a second user in a relationship group of a first user from a first terminal accessing the server using a first identifier, which is an identifier of the first user; and extending authorization of an IoT apparatus registered as an apparatus of the first user to the relationship group, in response to the request received from the first terminal.

The operation method may further include receiving an acceptance of the request to include the second user in the relationship group of the first user from a second terminal accessing the server using a second identifier, which is an identifier of the second user; and transmitting information about the IoT apparatus to the second terminal, wherein authorization for accessing and controlling the IoT apparatus is extended to the relationship group.

The operation method may further include receiving a request to control the IoT apparatus from the second terminal; and controlling the IoT apparatus.

The operation method may further include registering the IoT apparatus as an apparatus of the first user.

The operation method may further include selecting, by the first terminal, the relationship group from among a plurality of user groups.

The operation method may further include storing relationship information of the first user, the relationship information including information about a user (or users) included in each of the user groups for the first user.

The operation method may further include storing registered apparatus information of the first user, the registered apparatus information including information about each range of authorization corresponding to at least one of the registered IoT apparatuses registered as the apparatus of the first user.

The operation method may further include issuing a token of authorization for the second user corresponding to the IoT apparatus and transmitting the token to the second terminal.

The operation method may further include receiving a request to control the IoT apparatus with the token from the second terminal; confirming authorization of the second user for the IoT apparatus based on the token; and controlling the IoT apparatus.

According to one or more example embodiments, a server includes a memory that may store relationship information of a first user, the relationship information including information about a user (or users) included in each of a plurality of user groups for the first user, and also store registered

apparatus information of the first user, the registered apparatus information including information about each range of authorization corresponding to at least one IoT apparatus registered as an IoT apparatus of the first user; and a data processor configured to detect whether an IoT apparatus to which authorization may be granted to a second user exists among the registered apparatuses based on the relationship information of the first user and the registered apparatus information of the first user.

When the data processor detects that authorization for a first apparatus, which is one apparatus from among the registered apparatuses, is granted to the second user, the data processor may transmit information about the first apparatus to a terminal accessing the server using a second identifier of the second user.

The data processor may receive a request to control the first apparatus from the terminal and control the first apparatus.

The data processor may issue a token of authorization for the second user corresponding to the first apparatus and transmit the token to the terminal; receive a request to control the first apparatus with the token from the terminal; confirm authorization of the second user to the first apparatus based on the token; and control the first apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

These and/or other aspects will become apparent and more readily appreciated from the following description of the example embodiments, taken in conjunction with the accompanying drawings in which:

FIG. **1** is a configuration diagram of an example Internet of Things (IoT) system **1000**;

FIG. **2** is a flowchart of an illustrative method of operating the example IoT system **1000** of FIG. **1**;

FIG. **3** is a flowchart of an illustrative method of operating an example first terminal of FIG. **1**;

FIG. **4** is a configuration diagram of an example terminal **100**;

FIGS. **5**, **6**, **7**, and **8** are views of illustrative screen images of an output unit of an example terminal;

FIG. **9** is a flowchart of an illustrative method of operating the IoT system **1000** of FIG. **1**;

FIGS. **10** and **11** are views of illustrative screen images of an output unit of an example terminal;

FIG. **12** is a configuration diagram of an example server **200**;

FIG. **13** is a table for example user information stored in memory **230** of FIG. **12**;

FIG. **14** is a table regarding example relationship information of a first user which is stored in memory **230** of FIG. **12**;

FIG. **15** is a table regarding example registered apparatus information of the first user which is stored in memory **230** of FIG. **12**; and

FIG. **16** is a flowchart of an illustrative method (S**400**) of operating a server of FIG. **1**.

DETAILED DESCRIPTION

Reference will now be made in detail to example embodiments which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the example embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, the example embodiments are merely described below, by referring to the figures, to explain aspects of the present description. Expressions such as "at least one of", when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

The attached drawings for illustrating example embodiments of the present disclosure are referred to in order to gain a sufficient understanding of the present disclosure, the merits thereof, and objectives accomplished by the implementation of the present disclosure. In this regard, the present embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete and will fully convey the concept of the present embodiments to one of ordinary skill in the art, and the present disclosure will only be defined by the appended claims.

Hereinafter, the terms used in the specification will be briefly described and then the present disclosure will be described in detail.

As used herein, an 'Internet of things (IoT) device' may refer to any electronic device or computing device that may be connected to the Internet.

As used herein, an 'IoT terminal' may refer to any electronic device or computing device that may control an IoT apparatus.

As used herein, a 'server' may be any electronic device or computing device capable of providing an IoT service by being connected to the IoT terminal so that the IoT terminal may remotely control the IoT apparatus by accessing the server.

The terms used in this specification are general terms currently widely used in the art in consideration of the functions regarding the concepts disclosed herein, but the terms may vary according to the intention of those of ordinary skill in the art, case precedents, or new technology in the art. Also, some terms may be arbitrarily selected by the applicant, and in this case, the meaning of the selected terms will be described in detail in the detailed description of the present specification. Thus, the terms used herein have to be defined based on the meaning thereof together with the description throughout the specification.

FIG. **1** is a configuration diagram of an example IoT system **1000**.

Referring to FIG. **1**, the IoT system **1000** may include terminals **100-1**, **100-2**, . . . , and **100**-M, a server **200**, and an IoT apparatus **300**.

The terminals **100-1**, **100-2**, . . . , and **100**-M are for controlling IoT apparatuses and may control the IoT apparatus **300** by being connected to the IoT apparatus **300** via a network. The terminals **100-1**, **100-2**, . . . , and **100**-M may be any one of various electronic devices including, but not limited to, smart devices including smartphones or tablet PCs, portable electronic devices, wearable devices, home terminals that may be connected to a home network, smart TVs, set top boxes and the like.

The IoT apparatus **300** may be a general apparatus (or a thing) to which IoT is applied. Examples of the IoT apparatus **300** include, but are not limited to, sensors, such as temperature sensors, humidity sensors, sound sensors, motion sensors, proximity sensors, gas sensing sensors, or heat sensing sensors; home appliances, such as refrigerators, CCTVs, TVs, washing machines, or dehumidifiers; electric lights; fire alarms; and household appliances. However, the various embodiments described herein are not limited to these examples.

The IoT apparatus **300** may be controlled by a plurality of users **10-1**, **10-2**, . . . , and **10**-M. Each of the users **10-1**,

10-2, . . . , and 10-M may remotely control the IoT apparatus 300 through the server 200 by using the terminals 100-1, 100-2, . . . , and 100-M.

The server 200 may be a computer configured to provide an IoT service to the users 10-1, 10-2, . . . , and 10-M. Alternatively, the server 200 may be or include a computer-readable recording medium having recorded thereon a program for providing the IoT service. The server 200 may be wirelessly connected to each of the terminals 100-1, 100-2, . . . , and 100-M and the IoT apparatus 300. Therefore, the server 200 may communicate with each of the terminals 100-1, 100-2, . . . , and 100-M and the IoT apparatus 300. Accordingly, different terminals, for example, the first terminal 100-1 and the second terminal 100-2 may communicate with each other through the server 200. Furthermore, each of the terminals 100-1, 100-2, . . . , and 100-M may access the IoT apparatus 300 through the server 200 and control the same.

In FIG. 1, the first user 10-1 uses the first terminal 100-1, the second user 10-2 uses the second terminal 100-2. In other words, FIG. 1 illustrates that the users 10-1, 10-2, . . . , and 10-M use the terminals 100-1, 100-2, . . . , and 100-M, respectively. However, the users 10-1, 10-2, . . . , and 10-M may use respective terminals as illustrated in FIG. 1, or may use the same terminal. Terms such as the first terminal 100-1, the second terminal 100-2, and so on are used to distinguish users using the corresponding terminal.

Hereinafter, the first terminal 100-1 is a terminal used by the first user 10-1, and the second terminal 100-2 is a terminal used by the second user 10-2. Furthermore, the first terminal 100-1 may be a terminal accessing the server 200 using a first identifier, which is an identifier of the first user 10-1, and the second terminal 100-2 may be a terminal accessing the server 200 using a second identifier, which is an identifier of the second user 10-2.

Hereinafter, it is assumed that the first and second users 10-1 and 10-2 are already registered in the server 200. In other words, it is assumed that the first and second users 10-1 and 10-2 have respective accounts capable of using a service provided by the server 200 as the first and second users 10-1 and 10-2 access the server 200. A process of registering the first and second users 10-1 and 10-2 with the server 200 may be included in an example embodiment.

FIG. 2 is a flowchart of an illustrative method of operating the example IoT system 1000 of FIG. 1.

Referring to FIG. 2, the first terminal 100-1 may access the server 200 using the first identifier, which is an identifier of the first user (S110). The first terminal 100-1 may request the server 200 to establish a relationship between the first user and the second user (S120). The request for establishing the relationship may, for example, be a request for including the second user in a relationship group of the first user. The relationship group of the first user is a group that may include users related to the first user as members of the group. The relationship group of the first user may already include users having a previously established relationship with the first user rather than the second user.

The server 200 may store relationship information of the first user (S130). The relationship information of the first user may include information about the relationship group of the first user. The information about the relationship group of the first user includes, for example, information about which users are included in the relationship group of the first user. The server 200 may update the relationship information such that the second user is included in the relationship group of the first user.

An acceptance of the second user may be required when the first user requests establishing a relationship with the second user. In other words, a relationship between the first user and the second user may be established only when the second user accepts the request of the first user for establishing the relationship. In this case, the second user may be included in the relationship group of the first user only when the second user accepts the request for establishing the relationship. Therefore, the server 200 may store or update the relationship information based on some conditions or temporarily.

The first terminal 100-1 may request the server 200 to extend a range of authorization for an IoT apparatus registered as an apparatus of the first user to a relationship group (S140). Authorization for the IoT apparatus is a right granted to a user to be able to access the IoT apparatus and control the same through the server 200. The first user may have authorization for the IoT apparatus when the IoT apparatus is registered as an apparatus of the first user in the server 200. Not only the first user but also more than one user included in the relationship group may have authorization for the IoT apparatus when the range of authorization is extended to the relationship group. In other words, the one or more users included in the relationship group may also access the IoT apparatus through the server 200 and control the same. When the second user is included in the relationship group of the first user according to operation S120, the second user may also have authorization for the IoT apparatus that is the apparatus of the first user.

Hereinafter, 'a/the IoT apparatus registered as a/the apparatus of a/the first user" may be referred to as 'a/the registered apparatus of a/the first user'.

A plurality of IoT apparatuses may be registered as apparatuses of the first user in the server 200. An IoT apparatus to which authorization is extended to the relationship group in operation S140 may be a registered apparatus selected, by the first user, from among a plurality of registered apparatuses of the first user.

FIG. 2 illustrates that operation S140 of establishing a range of authorization is performed after operation S120 of requesting relationship establishing. However, operation S140 may be performed before operation S120.

The server 200 may store registered apparatus information of the first user (S150). The registered apparatus information of the first user may include information about at least one registered apparatus of the first user and information about a range of authorization corresponding to each respective registered apparatus. The server 200 may update the registered apparatus information of the first user with that the range of authorization for the IoT apparatus for which authorization is extended in operation S140.

FIG. 3 is a flowchart of an illustrative operation method (S201) of the example first terminal 100-1 of FIG. 1. The above descriptions of the first terminal 100-1 of FIG. 2 may also apply to the operation method (S201) of FIG. 3.

Referring to FIGS. 1 and 3, the first terminal 100-1 may access the server 200 using the first identifier, which is an identifier of the first user (S210). The first terminal 100-1 may request establishing a relationship between the first user and the second user (S220). Operation S220 may include operation S221 and operation S222 as discussed below.

The first terminal 100-1 may retrieve information about the second user for use in establishing a relationship with the first user (S221). For example, the first terminal 100-1 may provide a keyword to the server for retrieving the second user information, and thus the server 200 may retrieve the second user information. Then the server 200 may provide

the retrieved information to the first terminal **100-1**. The keyword may be an identifier or a name, etc. of the second user. The first terminal **100-1** may receive an input in a keyword form from the first user.

The first terminal **100-1** may select a relationship group to which the second user is to be included from among a plurality of user groups (S**222**). For example, the user groups may include a family group, a friend group, a colleague group, and so on. For example, the relationship group to which the second user is to be included may be selected as the family group. Various kinds of user groups may be defined previously in the server **200**. For example, the server **200** may previously define that the kinds of the user groups include a family group, a friend group and a colleague group. In other words, the kinds of the user groups in which the first user may establish a relationship with other users may be provided by the server **200**. Alternatively or additionally, the first user may change the kinds of user groups and add new kinds of user groups.

The first terminal **100-1** may select a relationship group from among the user groups. In other words, the first user may select a relationship group from among the user groups provided by the server **200**.

The first terminal **100-1** may register an IoT apparatus as an apparatus of the first user with the server **200** (S**230**). Operation S**230** may be realized in various ways. For example, if the first user directly contacts a physical interface such as a button of the IoT apparatus after the first terminal **100-1** accesses the server **200** using a first identifier, which is an identifier of the first user, the IoT apparatus may be registered as an apparatus of the first user. Alternatively, if the first terminal **100-1** identifies an IoT apparatus based on a simple service discovery protocol (SSDP) or a Wi-Fi Protected Setup (WPS) and detects a corresponding IoT apparatus after accessing the server **200** using a first identifier, which is an identifier of the first user, the detected IoT apparatus may be registered in the server **200** as an apparatus of the first user. However, these are only examples and details of operation S**230** in which the IoT apparatus is registered in the server **200** as an apparatus of the first user are not limited thereto.

The first terminal **100-1** may establish a range of authorization such that authorization for the IoT apparatus registered as an apparatus of the first user is extended to the relationship group (S**240**). The relationship group having the extended authorization may be a relationship group (e.g., a family group) from among the user groups such as a friend group, a colleague group, and a family group. Therefore, the second user to be included in the relationship group may have authorization for the IoT apparatus that is the registered apparatus of the first user.

There is no need to perform operations S**220** to S**240** in the first terminal **100-1** in the sequence showin in FIG. **3**. For example, operations S**230** and S**240** may be performed before operation S**220**. Furthermore, operation S**230** may be omitted if the IoT apparatus is already registered in the server **200** as an apparatus of the first user.

As described above, the authorization corresponding to the registered apparatus of the first user may be extended to the second user by establishing a relationship between the first user and the second user, according to an example embodiment. In this case, there is no need to register the registered apparatus of the first user with the server **200** as an apparatus of the second user. As described in operation S**230**, it may be complicated to register the IoT apparatus as an apparatus of a specific user. In other words, according to an example embodiment, the second user may have authorization corresponding to the registered apparatus of the first user without it being necessary to perform a complicated apparatus registering process. In summary, if a shared apparatus of multiple users is once registered as an apparatus of the first user, other users having a specific established relationship with the first user may have authorization for the shared apparatus without it being necessary to perform an iterative apparatus registering process. Therefore, user convenience may be improved.

Basically, the reason why authorization is granted to a user is to prevent other persons who do not have authorization from freely controlling an IoT apparatus of the user. In other words, it is important to ensure that authorization for the IoT apparatus is granted only to a user having a certain right or rights. According to an example embodiment, authorization for an IoT apparatus is extended to another user, that is, the second user, by the first user that is a registered user of the IoT apparatus. Therefore, it is ensured that authorization for the registered apparatus of the first user is extended to the second user having a right.

As described above, according to an example embodiment, it is ensured that authorization for the IoT apparatus is safely and efficiently shared among users.

FIG. **4** is a configuration diagram of an example terminal **100**. The terminal **100** of FIG. **4** is an example embodiment of a terminal that may be used by each of the users **10-1**, **10-2**, . . . , and **10**-M in the IoT system **1000** of FIG. **1**. In other words, when an nth user uses the terminal **100** of FIG. **4**, the terminal **100** of FIG. **4** may be the nth terminal **100**-*n* (n=1, 2, . . . , M) of FIG. **1**.

Referring to FIG. **4**, the terminal **100** may include a data processor **110**, a communicator **120**, an input unit **130**, and an output unit **140**. Components included in the terminal **100** may be connected to each other via a bus **150**. Some of the illustrated components may be omitted in some implementations, and the terminal **100** may include other components not illustrated.

The data processor **110** controls a general operation of the terminal **100**, and furthermore, may process a variety of data required for the operation of the terminal **100**. The data processor **110** may access a server using a first identifier, which is an identifier of the first user. In this case, the terminal **100** of FIG. **4** corresponds to the first terminal **100-1** of FIGS. **1** to **3**. The data processor **110** may request establishing a relationship between the first user and the second user in order to include the second user in a relationship group of the first user. Furthermore, the data processor **110** may establish a range of authorization such that authorization for an IoT apparatus registered as an apparatus of the first user is extended to the relationship group.

A control operation of the first terminal **100-1** described above in FIGS. **1** to **3** or a data process required for the control operation may be performed in the data processor **110**. The data processor **110** may be one of various devices such as a central processing unit (CPU), a micro processor, a graphic processing unit (GPU), an application specific integrated circuit (ASIC) and/or other type of circuitry.

The communicator **120** allows the terminal **100** to communicate with the server. The communicator **120** may include at least one component to allow the terminal **100** to communicate with an external device such as the server **200** (of FIG. **1**) or the IoT apparatus **300**. For example, the communicator **120** may include a short-range communication module, a wired communication module, a mobile communication module, and/or other type of communication circuitry.

The short-range communication module is a module including circuitry for performing short-range communication with a device located within a predetermined distance. As an example of a short-range communication technique according to the present exemplary embodiment, a wireless LAN, Wi-Fi, Bluetooth, ZigBee, Wi-Fi direct (WFD), an ultra wideband (UWB), an infrared data association (IrDA), Bluetooth low energy (BLE), a near field communication (NFC) may be used, but is not limited thereto.

The wired communication module is a module including circuitry for communication based on an electrical signal or an optical signal and may operate based on a wired communication technique via a pair cable, a coaxial cable, or an optical fiber cable, and the like.

The wireless communication module including transceiver circuitry for transceiving a wireless signal to at least one of a base station on a mobile communication network, an external device, and a server. For example, the wireless signal may be a voice call signal, a video communication call signal, or various types of data signal according to transceiving a text/multimedia message.

The input unit or device **130** and the output unit or device **140** may provide a user interface (UI) for a manipulation of the terminal **100** to a user. The output unit **140** may provide the UI for the manipulation of the terminal **100**. The output unit **140** may include, for example, a speaker, a printer, a cathode ray tube (CRT) display, a liquid crystal display (LCD) display, a plasma display panel (PDP) display, an organic light emitting diode (OLED) display, a field emission display (FED) display, a light emitting diode (LED) display, a vacuum fluorescence display (VFD) display, a digital light processing (DLP) display, a flat panel display (FPD) display, a three-dimensional (3D) display, a transparent display, and/or various other output devices as will be apparent to one skilled in the art.

The input unit **130** may be used by a user to input a command for manipulation of the terminal **100**. The input unit **130** may include, for example, a keyboard, a mouse, a touch screen, a voice recognizer, a fingerprints recognizer, an iris recognizer and/or other input devices as will be apparent to one skilled in the art.

When the terminal **100** of FIG. **4** is the first terminal **100-1** of FIGS. **2** and **3**, the terminal **100** may perform the operations of FIGS. **2** and **3** via the UI. In this case, the UI may be provided by the server **200** (of FIG. **2**).

FIG. **5** is a view of an illustrative screen image **50** of an output unit (display) of an example terminal. The screen image **50** of FIG. **5** may be a screen image of the output unit **140** of the terminal **100** of FIG. **4**.

Referring to FIG. **5**, the screen image **50** may provide a UI whereby the first user **10-1** selects a relationship group (e.g., family) to which the second user is to be included from among a plurality of user groups (e.g., friend, colleague, and family groups). For example, the terminal **100** (of FIG. **4**) may output the screen image **50** of FIG. **5** in order to perform operation **S222** of selecting a relationship group to which the second user is to be included from among a plurality of user groups described with respect to FIG. **3**.

A message including, for example, text and/or graphics, for selecting which user group from among a plurality of user groups of the first user **10-1** into which the second user should be included may be displayed on the screen image **50**. FIG. **5** illustrates the message 'select relationship of the second user', but this is the only a non-limiting example.

Furthermore, a user group list **51**, which is a list of the user groups that may be selected by the first user **10-1** may be displayed on the screen image **50**. As in the example of FIG. **5**, the user group list **51** may include a friend group, a colleague group, and a family group. The server **200** (of FIG. **2**) may previously define the user groups and the user group list **51** may be displayed based on the previously defined user groups in the server **200** (of FIG. **2**). The first user **10-1** may select the family group as a relationship group to which the second user is to be included by selecting 'family' from among user groups in the user group list **51**. The first user **10-1** may select one of the user groups as the relationship group from among the user group list **51** by various methods such as touching, clicking, double-clicking, etc. The 'family' selected by the first user **10-1** may be displayed in a visually distinct manner from other user groups that are not selected.

FIG. **6** is a view of an illustrative screen image **60** of an output unit of an example terminal. The screen image **60** of FIG. **6** may be a screen image of the output unit **140** of the terminal **100** of FIG. **4**. The screen image **60** of FIG. **6** may be another example embodiment of the screen image **50** of FIG. **5**.

Referring to FIG. **6**, the screen image **60** may provide a UI whereby the first user **10-1** selects a relationship group (e.g., family) into which the second user is to be included from among a plurality of user groups (e.g., friend, colleague, and family groups), similar to the screen image **50** of FIG. **5**.

As in FIG. **5**, a message (including, for example, text and/or graphics) for selecting which user group from among a plurality of user groups of the first user **10-1** into which the second user should be included ('select relationship of the second user') may be displayed on the screen image **60**.

Relationship information **61** of the first user may be displayed on the screen image **60** of FIG. **6**. The relationship information **61** of the first user may include at least one user group (friend, colleague, and family groups) that may be selected by the first user **10-1** and a user ID representing a user included in each of the user groups. For example, there is no user in the friend group; users C and D are included in the colleague group; and user E is included in the family group. The first user **10-1** may grasp relationship information with other users that is previously established by the first user **10-1** through the relationship information **61** of the first user. Since FIG. **6** is only an example, there will be no information about the user ID in the relationship information **61** of the first user if the first user **10-1** has never established a relationship with other users before.

The first user **10-1** may select the family group as a relationship group to which the second user is to be included by selecting 'family' from the relationship information **61** of the first user.

If the first user **10-1** selects 'family' from the relationship information **61** of the first user, the screen image **60** of FIG. **6** may be converted into a screen image of FIG. **7**. As in the screen image **60** of FIG. **7**, a 'second user' may be added to the family group of the relationship information **61** of the first user. The relationship information **61** of the first user in FIG. **7** may be stored in the server **200** (see **S130** of FIG. **2**).

As in FIGS. **5** to **7**, the first user **10-1** selects a relationship between the first and second users that is a relationship from among the user groups (friend, colleague, and family groups) that are previously defined. Since the relationships are previously defined and each of the relationships is determined by the selection of the first user, a process for determining the relationship between the first and second users may be performed via a simple algorithm. Therefore, a system overhead for determining the relationship between the first and second users may be very small.

According to the selection of the first user, the first terminal **100-1** may transmit a request to the server for establishing a relationship to include the second user to a relationship group (family) of the first user **10-1**.

FIG. **8** is a view of an illustrative screen image **80** of an output unit of an example terminal. The screen image **80** of FIG. **8** may be a screen image of the output unit **140** of the terminal **100** of FIG. **4**.

Referring to FIG. **8**, the screen image **80** may provide a UI whereby the first user **10-1** establishes a range of authorization for an IoT apparatus (e.g., a second apparatus) registered as an apparatus of the first user **10-1**. In other words, the terminal **100** (of FIG. **4**) may output the screen image **80** of FIG. **8** in order to perform operations S**140** and S**240** of establishing the range of authorization described with respect to FIGS. **2** and **3**.

Registered apparatus information **81** of the first user may be displayed on the screen image **80**. The registered apparatus information **81** of the first user may include information about at least one registered apparatus (first to fourth devices) of the first user and information about a range of authorization (family, colleague, friend, and a blank) corresponding to each of the registered apparatuses. When the range of authorization is blank (may also be displayed as '-', NULL, or 'himself'), only the first user **10-1** may have authorization. For example, a range of authorization for the first device is a family, a range of authorization for the second and third devices is the first user **10-1** himself, and a range of authorization for a fourth device is a colleague. The first user **10-1** may grasp a range of authorization that is established previously by the first user **10-1** through the registered apparatus information **81** of the first user. As FIG. **8** is only an example, all ranges of authorization will be blank if the first user **10-1** has not previously established a range of authorization corresponding to the registered apparatus.

If the first user **10-1** selects a 'second device' from the registered apparatus information **81**, an authorization selection window **82** for establishing the range of authorization for the second device may be displayed on the screen image **80**. The authorization selection window **82** may include a family, a colleague, and a friend. The first user **10-1** may establish the range of authorization of the second device as 'family' by selecting 'family' from the authorization selection window **82**.

The registered apparatus information **81** of the first user in FIG. **8** may be stored in the server **200** (see S**150** of FIG. **2**). In this case, the server **200** may store the registered apparatus information of the first user by updating the range of authorization of the second apparatus to be within a family.

The UIs of FIGS. **5** to **8** are only examples and the example embodiments described herein are not limited to these UIs.

FIG. **9** is a flowchart of an illustrative method of operating the example IoT system **1000** of FIG. **1**.

Referring to FIGS. **1** and **9**, the second terminal **100-2** may access the server **200** using a second identifier, which is an identifier of the second user (S**310**). The server **200** may transmit the request from the first user (S**120** of FIG. **2**) for establishing the relationship to the second terminal **100-2** (S**320**).

The second terminal **100-2** may accept the request for establishing the relationship from the first user (S**330**). A relationship between the first and second users may be established when the second terminal **100-2** accepts the request. The request for establishing the relationship from the first user may be about including the second user in a relationship group of the first user. Furthermore, the relationship group may be a user group selected by the first user from among a plurality of user groups.

The server **200** may store relationship information of the first user (S**340**). The server **200** may update the relationship information so as to include the second user in the relationship group of the first user and store the same. Therefore, the server **200** may store the relationship information of the first user, and furthermore, may store the registered apparatus information of the first user (S**150** of FIG. **2**).

The server **200** may detect whether an IoT apparatus to which authorization is granted to the second user exists among a plurality of registered apparatuses of the first user based on the relationship information of the first user and the registered apparatus information of the first user (S**350**). The server **200** may retrieve the relationship information of the first user and the registered apparatus information of the first user, and may detect whether an IoT apparatus with authorization extended to the second user exists.

If an IoT apparatus that is a registered apparatus of the first user and with authorization extended to the second user is detected, the server **200** may issue a token of authorization for the second user for the IoT apparatus. The server **200** may transmit the issued token to the second terminal **100-2**. The token may, for example, be a string generated by combination of text. The token may be information shared between the server **200** and the second user, and users other than the second user may not use the token.

The server **200** may transmit apparatus information of the second user to the second terminal **100-2** based on the detection result (S**360**). The apparatus information of the second user may be information about at least one IoT apparatus to which authorization is granted to the second user. The apparatus information of the second user may include at least one of registered apparatus information of the second user and information of the IoT apparatus to which authorization is extended to the second user from among the registered apparatuses of the first user. The registered apparatus information of the second user is the information of the IoT apparatus registered by the second user and granting authorization to the second user.

For example, the second user may be established as 'family' of the first user (see FIG. **7**), and a range of authorization corresponding to the second apparatus from among the registered apparatuses of the first user may be 'family' (see FIG. **8**). In this case, the apparatus information of the second user may include information of the 'second apparatus'.

The second terminal **100-2** may request the server **200** to control the apparatus to which authorization is granted to the second user (S**370**). The second terminal **100-2** may request the server **200** to control the IoT apparatus (i.e., the 'second apparatus') to which authorization is granted to the second user from among the registered apparatuses of the first user. In this case, the second terminal **100-2** may request the server **200** to control the IoT apparatus (i.e., 'second apparatus') with the token issued from the server **200**. The server **200** may confirm authorization of the second user corresponding to the IoT apparatus based on the token. In this way, the server **200** may issue and manage the token in order to verify authorization.

As the token is used, it is possible to avoid exposure of the account information of the second user in order to access the registered apparatus of the first user. If the account information including an ID and a password of the second user is exposed, every access authorization corresponding to a personal account of the second user may be acquired by

unauthorized parties. As only the authorization corresponding to the registered apparatus of the first user is granted when the token is used, the account information of the second user may be protected effectively. Furthermore, the convenience and reliability of a system operation may be ensured by easily verifying the authorization granted to the second user with the token.

Referring again to FIG. **4**, the terminal **100** of FIG. **4** may be the second terminal **100-2**. In other words, the terminal **100** of FIG. **4** may be the second terminal **100-2** while the second user accesses the server **200** by using the terminal **100** of FIG. **4**. The terminal **100** of FIG. **4** may perform an operation of FIG. **9** by using a UI. In this case, the UI may be provided by the server **200**.

FIG. **10** shows an illustrative screen image **20** of an example output unit of a terminal. The screen image **20** of FIG. **10** may be a screen image of the output unit **140** of the terminal **100** of FIG. **4**.

Referring to FIG. **10**, the screen image **20** may provide an UI **21** whereby the second user **10-2** confirms whether a request received from a first user for establishing a relationship therewith is accepted. In other words, the terminal **100** (of FIG. **4**) may output the screen image **20** as illustrated in FIG. **10** in order to perform operation S**330** of accepting the request for establishing the relationship described with respect to FIG. **9**.

The UI **21** may display a message (including, e.g., text and/or graphics) confirming whether the request for establishing the relationship with the second user **10-2** is accepted. FIG. **10** illustrates a message such as 'The first user has requested establishing a family relationship with second user. Would you like to accept it?', but the message is not limited thereto. The UI **21** may further display icons ('Yes' or 'No') that allow selection of acceptance or denial of the request. The second user **10-2** may select one of the icons ('Yes' or 'No') in the UI **21** via various methods such as touching, clicking, or double-clicking.

The second user **10-2** may input information about accepting request for establishing a relationship between the first and the second users in the terminal **100** (of FIG. **4**) by selecting the 'Yes' icon that indicates acceptance of the request in the UI **21** illustrated in FIG. **10**.

FIG. **11** shows an illustrative screen image **30** of an example output unit of a terminal. The screen image **30** of FIG. **11** may be a screen image of the output unit **140** of the terminal **100** of FIG. **4**.

Referring to FIG. **11**, the screen image **30** may display device information **31** of the second user. In other words, the terminal **100** (of FIG. **4**) may output the screen image **30** of FIG. **11** after performing operation S**360** of transmitting the device information of the second user explained with respect to FIG. **9**.

The device information **31** of the second user includes information of at least one IoT apparatus to which authorization is granted to the second user **10-2**. For example, the at least one IoT apparatus may be an LED lamp, a second apparatus, or a washing machine. The apparatus information **31** of the second user may further include authorization-type information. The authorization-type information may indicate whether authorization to the apparatus is granted because the apparatus is a registered apparatus of the second user or because a range of authorization is established as a specific (e.g., family) relationship with another user (e.g., a first user) and the authorization is extended thereby. For example, the authorization-type may be the second user or a family of the first user. The authorization-type information is only an example, and thus may be not included in the apparatus information **31** of the second user.

In the example of FIG. **11**, the second user has authorization for the LED lamp and the washing machine since they are previously registered as apparatuses of the second user. The second user has authorization for the second apparatus since the second user is established as belonging to a family of the first user. The second user **10-2** may select a 'second apparatus' from the apparatus information **31** of the second user output from the screen image **30**, and may control the 'second apparatus' by accessing it.

FIG. **12** illustrates a configuration of an example server **200**. The above descriptions of the example embodiment of the server **200** included in the IoT system **1000** of FIG. **1** may also apply to the server **200** of FIG. **12**.

Referring to FIGS. **1** and **12**, the server **200** may include a data processor **210**, a communicator **220**, and a memory **230**. The components included in the server **200** may be connected to each other via a bus **240**. Some of the illustrated components may be omitted in some implementations, and the server **200** may include other components not illustrated.

The data processor **210** may control a general operation of the server **200** and process a variety of data required for the operation of the server **200**. The controlling of the operation of the server **200** or the processing of the data required for the operation may be performed in the data processor **210**. The data processor **210** may be one of various devices such as a CPU, a micro processor, a GPU, an ASIC and/or other circuitry.

The communicator **220** may include at least one component for allowing the server **200** to communicate with an external device such as a plurality of terminals **100-1**, **100-2**, . . . , and **100**-M, or the IoT apparatus **300**. The communicator **220** may be wirelessly connected to the communicator **120** of the terminal **100** shown in FIG. **4**. The descriptions of the communicator **120** in FIG. **4** may also apply to the communicator **220**.

The memory **230** may store a variety of information or data for an operation of the server **200**, such as user information, relationship information of a user, or registered apparatus information of a user.

The data processor **210** may detect whether an IoT apparatus to which authorization is granted to a second user exists among at least one registered apparatus of a first user based on relationship information of the first user which is stored in the memory **230** and registered apparatus information of the first user which is stored in the memory **230**.

FIG. **13** is an illustrative table for example user information **410** stored in the memory **230** of FIG. **12**.

Referring to FIG. **13**, the user information **410** is information of users registered in the server **200**. The users registered in the server **200** may be identified by a user ID. The user information **410** may include a variety of user information such as a name, a password, and an email address of each of the users.

FIG. **14** is an illustrative table regarding example relationship information **420** of a first user which is stored in the memory **230** of FIG. **12**.

Referring to FIG. **14**, the relationship information **420** of the first user may include information of a plurality of user groups of the first user based on a user relationship established by the first user. The relationship information **420** of the first user may include a user ID representing a user included in each of the user groups. Even though FIG. **14** illustrates only the relationship information **420** of the first

user, the memory **230** of FIG. **12** may also store the relationship information with respect to other users.

FIG. **15** is an illustrative table regarding example registered device information **430** of a first user which is stored in the memory **230** of FIG. **12**.

Referring to FIG. **15**, the registered apparatus information **430** of the first user may include registered apparatus information of the first user and information about a range of authorization of each of the registered apparatuses. Even though FIG. **15** illustrates only the registered apparatus information **430** of the first user, the memory **230** of FIG. **12** may also store the apparatus information with respect to other users.

As illustrated in FIGS. **13** to **15**, user information, relationship information of a user, and apparatus information of a user, which are stored in the memory **230** (of FIG. **12**) may be table-type data.

FIG. **16** is a flowchart of an illustrative operation method (S**400**) of the example server **200** of FIG. **1**. The above descriptions may also apply to the method (S**400**) of FIG. **16**.

Referring to FIGS. **1** and **16**, the server **200** may receive a request for establishing a relationship between first and second users from the first terminal **100-1** accessing the server **200** using a first identifier, which is an identifier of the first user **10-1** (S**410**). The request for establishing the relationship may be about including the second user to a relationship group.

The server **200** may transmit the request for establishing the relationship from the first user **10-1** to the second terminal **100-2** which accesses the server **200** using a second identifier, which is an identifier of the second user **10-2**.

The server **200** may receive an acceptance corresponding to the request for establishing the relationship from the second terminal **100-2** (S**420**). The relationship between the first and second users **10-1** and **10-2** is established according to the acceptance of the second terminal **100-2**. The server **200** may store relationship information of the first user (e.g., FIG. **14**) (S**430**).

The server **200** may establish a range of authorization for at least one registered apparatus registered as an apparatus of the first user in response to a request received from the first terminal **100-1** (S**440**). In this case, a range of authorization corresponding to an IoT apparatus from among the at least one registered apparatus may be established as a relationship group including the second user. The server **200** may store the registered apparatus information of the first user (e.g., FIG. **15**) (S**450**).

The server **200** may detect an apparatus to which authorization is granted to the second terminal **100-2** (S**460**). The server **200** may detect whether an IoT apparatus to which authorization is granted to the second user exists among the registered apparatuses of the first user, based on the relationship information of the first user and the registered apparatus information of the first user.

If the IoT apparatus whose authorization is extended to the second user is detected, the server **200** may issue a token of authorization of the second user corresponding to the IoT apparatus (S**470**). The server **200** may transmit the issued token to the second terminal **100-2**.

The server **200** may receive a request for controlling the IoT apparatus with the token from the second terminal **100-2** (S**480**). The server **200** may confirm the authorization of the second user corresponding to the IoT apparatus based on the token. After confirming the authorization of the second user, the server **200** may control the IoT apparatus responding to the request of the second terminal **100-2** (S**490**).

As described above, according to an example embodiment, the authorization for the registered apparatus of a first user may be extended to a second user who is related to the first user, without performing an individual registering process. The second user may have the authorization for the registered apparatus of the first user without it being necessary to perform a complicated registering process. Therefore, user convenience may be improved.

Furthermore, according to a selection of a first user, who is an original owner of the authorization for the IoT apparatus, the authorization may be extended to other users. Therefore, the certainty that other users having extended authorization are legitimate users corresponding to the IoT apparatus may be improved.

Furthermore, a first user may select both of a second user for extending authorization and the relationship between the first and second users. Therefore, a complicated data process to select the second user or to analyze the relationship between the first and second users is not necessary. Therefore, a system overhead generated when the authorization is extended may not increase.

The embodiments of the present invention may be written as computer programs and may be implemented in general-use digital computers that execute the programs using a computer-readable recording medium.

Examples of the computer-readable recording medium include magnetic storage media (e.g., ROM, floppy disks, hard disks, etc.), optical recording media (e.g., CD-ROMs, or DVDs), etc), and transmission media such as Internet transmission media.

It should be understood that the example embodiments described herein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each example embodiment should typically be considered as available for other similar features or aspects in other example embodiments.

While one or more example embodiments have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope as defined by the following claims.

What is claimed is:

1. A computer program product comprising a non-transitory computer-readable storage medium having a computer program which, when executed by at least one processor of an electronic device, causes the electronic device to:

access a server using an identifier of a first user;

display on a screen of the electronic device a list of Internet of Things (IoT) apparatuses associated with the first user;

receive a selection of an IoT apparatus among the displayed list of IoT apparatuses;

display on the screen of the electronic device a list of groups associated with the first user;

receive a selection of a group among the displayed list of groups; and

in order to apply authorization for controlling the selected IoT apparatus to a user in the selected group, transmit toward an electronic device of a second user a request for entrance of the selected group such that the second user, upon accepting the request, is authorized to access and control the selected IoT apparatus through the server.

2. The computer program product of claim **1**, wherein the identifier of the first user and identifier of the second user who accepts the request are registered in the server.

3. The computer program product of claim 1, wherein a token related to the selected IoT apparatus is transmitted to the second user who accepts the request.

4. The computer program product of claim 1, wherein the second user, when not accepting the request, does not have the authorization to access and control the selected IoT apparatus through the server.

5. The computer program product of claim 1, wherein the listed IoT apparatuses are registered as apparatuses of the first user in the server.

6. The computer program product of claim 1, wherein at least one of the listed IoT apparatuses is registered as an apparatus of the first user based on a direct interaction with a physical interface of the at least one of the listed IoT apparatuses.

7. An electronic device comprising:

a display;

at least one processor; and

a memory storing a computer program which, when executed by the at least one processor, causes the electronic device to:

access a server using an identifier of a first user;

display on a screen of the display a list of Internet of Things (IoT) apparatuses associated with the first user;

receive a selection of an IoT apparatus among the displayed list of IoT apparatuses;

display on the screen of the display a list of groups associated with the first user;

receive a selection of a group among the displayed list of groups; and

in order to apply authorization for controlling the selected IoT apparatus to a user in the selected group, transmit toward an electronic device of a second user a request for entrance of the selected group such that, the second user, upon accepting the request, is authorized to access and control the selected IoT apparatus through the server.

8. The electronic device of claim 7, wherein the identifier of the first user and identifier of a second user who accepts the request are registered in the server.

9. The electronic device of claim 7, wherein a token regarding the selected IoT apparatus is transmitted to the second user who accepts the request.

10. The electronic device of claim 7, wherein the second user, when not accepting the request, does not have the authorization to access and control the selected IoT apparatus through the server.

11. The electronic device of claim 7, wherein the listed IoT apparatuses are is registered as apparatuses of the first user in the server.

12. The electronic device of claim 7, wherein at least one of the listed IoT apparatuses is registered as an apparatus of the first user based on a direct interaction with a physical interface of the at least one of the listed IoT apparatuses.

13. A method, performed at an electronic device, comprising:

accessing a server using an identifier of a first user;

displaying on a screen of the electronic device a list of Internet of Things IoT apparatuses associated with the first user;

receiving a selection of an IoT apparatus among the displayed list of IoT apparatuses,

displaying on the screen of the electronic device a list of groups associated with the first user;

receiving a selection of a group among the displayed list of groups; and

in order to apply authorization for controlling the selected IoT apparatus to a user in the selected group, transmitting toward an electronic device of a second user a request for entrance of the selected group such that the second user, upon accepting the request, is authorized to access and control the selected IoT apparatus through the server.

14. The method of claim 13, wherein the identifier of the first user and identifier of the second user who accepts the request are registered in the server.

15. The method of claim 13, wherein a token related to the selected IoT apparatus is transmitted to the second user who accepts the request.

16. The method of claim 13, wherein the second user, when not accepting the request, does not have the authorization to access and control the selected IoT apparatus through the server.

17. The method of claim 13, wherein the listed IoT apparatuses are registered as apparatuses of the first user in the server.

18. The method of claim 13, wherein at least one of the listed IoT apparatuses is registered as an apparatus of the first user based on a direct interaction with a physical interface of the at least one of the listed IoT apparatuses.

19. A computer program product comprising a non-transitory computer-readable storage medium having a computer program which, when executed by at least one processor of an electronic device, cause the electronic device to:

access a server using an identifier of a second user;

receive, from a first user having authorization of an Internet of Things (IoT) apparatus, a request for entrance of a group associated with the first user at the electronic device of the second user, wherein the authorization for controlling the IoT apparatus is applied by the first user to the group;

upon accepting the request, acquire the authorization of the IoT apparatus to access and control the IoT apparatus of the first user through the server;

display a list of IoT apparatuses associated with the second user, including the IoT apparatus of the first user, on a screen of the electronic device of the second user; and

access and control the IoT apparatus of the first user through the server.

20. An Internet of Things (IoT) apparatus comprising:

a physical interface;

at least one processor; and

a memory storing a computer program thereon which, when executed by the at least one processor, causes the IoT apparatus to:

allow the IoT apparatus to be registered by an electronic device of a first user in a server based on a interaction of the physical interface with the first user, wherein the first user has authorization to access and control the IoT apparatus through the server,

wherein, the IoT apparatus is accessed and controlled, through the server, by the electronic device of the first user and an electronic device of a second user to perform a corresponding function,

wherein a second user, by accepting a request from the first user, enters a group associated with the first user, and acquires the authorization to access and control the IoT apparatus through the server without the second user's interaction with the physical interface.

21. A system comprising:

an electronic device; and

an Internet of Things (IoT) apparatus, wherein the IoT apparatus is registered in a server by the electronic device of a first user, and the first user has authorization of the IoT apparatus to access and control the IoT apparatus through the server,

wherein the electronic device is configured to:

receive a selection of the IoT apparatus among a displayed list of IoT apparatuses;

display on a screen of the electronic device a list of groups associated with the first user;

receive a selection of a group from the displayed list of groups; and

in order to apply authorization for controlling the selected IoT apparatus to users in the selected group, transmit toward an electronic device of a second user a request for entrance of the selected relation group such that the second user, upon accepting the request, is authorized to access and control the selected IoT apparatus through the server.

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